WHAT IS CLAIMED IS:

1.   An image processing apparatus comprising:

acquisition device which acquires at least one color signal value pair indicating color signal values from an image;

determination device which determines an image processing parameter on the basis of the acquired color signal value pair;

registration device which registers the image processing parameter determined by said determination device; and

conversion device which converts color signal values of an input image on the basis of the image processing parameter determined by said determination device, and outputs a converted image as an output image.

2.   The apparatus according to claim 1, wherein said acquisition device acquires the color signal value pair on the basis of color signal values of corresponding pixels in a first image, and a second image obtained by retouching the first image.

3.   The apparatus according to claim 1, wherein said acquisition device acquires the color signal value pair from one image recorded on a detachable recording medium.

4.   The apparatus according to claim 1, wherein said acquisition device acquires the color signal value pair

from color signal values of corresponding pixels in a first image recorded on a detachable recording medium, and a second image which is recorded on the detachable recording medium and is different from the first image.

5.   The apparatus according to claim 1, further comprising designation device which allows a user to designate a region on the image, and wherein said acquisition device acquires at least one color signal value pair corresponding to the region designated by said designation device.

6.   The apparatus according to claim 2, wherein for each of a plurality of grid points set on a color space,

said acquisition device extracts pixels having color signal values near a grid point of interest from the first image, and extracts pixels in the second image corresponding to the extracted pixels,

said acquisition device determines a color signal value after change of the grid point of interest on the basis of the signal values of the pixels extracted from the first and second images, and

said acquisition device sets a color signal value of the grid point of interest, and the determined color signal value after change as the color signal value pair.

7.   The apparatus according to claim 2, wherein the first and second images have the same image size, and

are stored in a storage medium in the same image format.

8.   The apparatus according to claim 2, wherein said conversion device processes a sensed image obtained from image sensing device as the input image, and

the first and second images are thumbnail images obtained by reducing the sensed image.

9.   The apparatus according to claim 1, wherein said acquisition device acquires a designated value pair consisting of first and second color signal values on the basis of first and second designated positions designated on one or two images, and determines the color signal value pair on the basis of the designated value pair.

10.   The apparatus according to claim 8, wherein for each of a plurality of grid points set on a color space,

said acquisition device extracts designated value pairs, the first color signal values of which are located near a grid point of interest,

said acquisition device determines a color signal value after change of the grid point of interest on the basis of changes of the first and second color signal values in the extracted designated value pairs, and

said acquisition device sets the color signal value of the grid point of interest, and the determined color signal value after change as the color signal

value pair.

11.   The apparatus according to claim 9, wherein the first and second images have the same image size, and are stored in a storage medium in the same image
5 format.

12.   The apparatus according to claim 9, wherein said conversion device processes a sensed image obtained from image sensing device as the input image, and

the first and second images are thumbnail images
10 having a smaller size than the sensed image.

13.   The apparatus according to claim 1, further comprising:

selection device which selects one of a plurality of processing modes using different image processing
15 parameters, and

wherein said registration device registers the image processing parameter determined by said determination device as one of the plurality of processing modes, and
20   when said selection device selects one of the processing modes, said conversion device executes a conversion process using the image processing parameter registered by said registration device.

14.   The apparatus according to claim 1, wherein
25 holding device stores the image processing parameter determined by said determination device in a first storage device, and

said conversion device stores the output image in a second storage medium.

15. The apparatus according to claim 1, further comprising:

5   display device which displays the image, and

wherein said registration device registers a plurality of different image processing parameters in correspondence with a processing mode, and

the plurality of different image processing

10   parameters are displayed on said display device.

16. The apparatus according to claim 1, wherein the conversion process includes:

inputting a sensed image obtained by an image sensing unit as an input image,

15   processing the sensed image by interpolation so that all pixels of respective color components have values;

amplifying a color difference of the image that has undergone the interpolation process;

20   applying gamma conversion to the image whose color difference has been amplified; and

applying hue correction to the image that has undergone the gamma conversion, and

said determination device changes parameters in

25   the interpolation process, color difference amplification, and hue correction.

17. The apparatus according to claim 1, wherein said

determination device applies inverse conversion of said

conversion device to the color signal value before

conversion of the color signal value pair using an

image processing parameter which is set in advance, and

5   said determination device changes the image

processing parameter to reduce a difference between a

color signal value obtained by processing the color

signal value obtained by the inverse conversion by said

conversion device, and the color signal value after

10   conversion of the color signal value pair.

18.   The apparatus according to claim 1, wherein the

conversion process has:

        multi-dimensional lookup table conversion device

which converts an image using a multi-dimensional

15   lookup table to obtain an output image, and

        said determination device changes the

multi-dimensional lookup table on the basis of the

color signal value pair.

19.   The apparatus according to claim 18, wherein the

20   multi-dimensional lookup table is a three-dimensional

lookup table including R, G, and B as elements.

20.   An image sensing apparatus comprising:

        an image sensing unit; and

        an image processing apparatus of claim 1,

25   wherein said image processing apparatus processes

sensed image data obtained by said image sensing unit

as the input image.

21. An image processing method comprising:

acquiring at least one color signal value pair indicating color signal values from an image;

determining an image processing parameter on the

5 basis of the acquired color signal value pair;

registering the image processing parameter determined in the determination step; and

converting color signal values of an input image on the basis of the image processing parameter

10 determined in the determination step, and outputting a converted image as an output image.

22. An apparatus for generating a color conversion table, comprising:

storage device which stores first and second

15 images, pixel values of which are expressed on an N-dimensional color space;

generation device which generates an N-dimensional color conversion table on the basis of differences between pixel values of corresponding

20 pixels in the first and second images; and

adjustment device which adjusts generation of table values of the color conversion table by said generation device so that a change amount of a pixel value defined by the color conversion table generated

25 by said generation device does not exceed a predetermined value.

23. The apparatus according to claim 22, wherein said

generation device comprises:

detection device which detects, from the first image, pixels having pixel values within a predetermined distance range from a grid point value of a grid point selected from respective grid points of the N-dimensional color conversion table;

calculation device which calculates an average value of differences between pixel values of corresponding pixels in the first and second images in association with the pixels detected by said detection device; and

determination device which determines a value of the selected grid point on the basis of the average value calculated by said calculation device.

24. The apparatus according to claim 22, wherein when a distance between the pixel values of the corresponding pixels on the color space exceeds a threshold value, said adjustment device adjusts the difference between the pixel values of the corresponding pixels on the basis of the distance and the threshold value.

25. The apparatus according to claim 24, wherein let (A0, A1, A2,..., AN) be pixel values in the first image, (B0, B1, B2,..., BN) be pixel values of corresponding pixels in the second image, and Diff be the distance, and when the distance Diff given by:

$$Diff = \sqrt{(A0 - B0)^2 + (A1 - B1)^2 + (A2 - B2)^2 + \cdots + (An - Bn)^2}$$

is larger than a predetermined threshold value T, said adjustment device multiplies differences between the corresponding pixels for respective components by a value obtained based on the threshold value T and the

5   distance Diff.

26.   The apparatus according to claim 24, wherein said adjustment device determines, as the distance, a maximum value Diff of differences between pixel values for respective components of corresponding pixels of

10   the first and second images, and when the distance is larger than a predetermined threshold value T, said adjustment device multiplies the differences for respective components by a value obtained based on the threshold value T and the distance Diff.

15   27.   The apparatus according to claim 22, wherein when a distance between pixel values before and after conversion by the color conversion table generated by said generation device exceeds a threshold value, said adjustment device adjusts a corresponding table value

20   in the color conversion table.

28.   The apparatus according to claim 27, wherein let (A0, A1, A2,..., AN) be pixel values before conversion by the color conversion table, (B0, B1, B2,..., BN) be pixel values after conversion, and Diff be the

25   distance, and when the distance Diff given by:

$$Diff = \sqrt{(A0 - B0)^2 + (A1 - B1)^2 + (A2 - B2)^2 + \cdots + (An - Bn)^2}$$

is larger than a predetermined threshold value T, said

adjustment device updates the color conversion table by multiplying the corresponding table value by a value obtained based on the threshold value T and the distance Diff.

5   29.   The apparatus according to claim 27, wherein said adjustment device determines, as the distance, a maximum value Diff of differences between pixel values before and after conversion by the color conversion table for respective components, and when the distance

10   is larger than a predetermined threshold value T, said adjustment device updates the color conversion table by multiplying the corresponding table value by a value obtained based on the threshold value T and Diff.

30.   The apparatus according to claim 22, wherein when

15   a difference between grid point data of the color conversion table generated by said generation device and a reference table is not less than a predetermined value, said adjustment device adjusts the grid point data of the color conversion table.

20   31.   The apparatus according to claim 30, wherein let (A0, A1, A2,...., AN) be grid point data of the color conversion table, (B0, B1, B2,...., BN) be grid point data of the reference table, and Diff be the difference, and when the difference Diff given by:

25    $$Diff = \sqrt{(A0-B0)^2 + (A1-B1)^2 + (A2-B2)^2 + \cdots + (An-Bn)^2}$$

is larger than a predetermined threshold value T, said adjustment device multiplies the grid point data by a

value obtained based on the threshold value T and the difference Diff.

32.   The apparatus according to claim 31, wherein when a maximum value Diff of differences between corresponding grid point data of the color conversion table and reference table for respective components is larger than the threshold value T, said adjustment device multiplies respective components of the grid point data of the color conversion table by a value obtained based on the threshold value T and Diff.

33.   The apparatus according to claim 22, further comprising:

conversion device which convertes data of respective grid points of the color conversion table generated by said generation device into data on an M-dimensional space.

34.   A method for generating a color conversion table, comprising:

generating an N-dimensional color conversion table on the basis of differences between pixel values of corresponding pixels in first and second images, pixel values of which are expressed on an N-dimensional color space; and

adjusting generation of table values of the color conversion table in the generating step so that a change amount of a pixel value defined by the color conversion table generated in the generation step does

not exceed a predetermined value.

35.   A color conversion apparatus comprising:

input device which inputs image data;

conversion device which converts the image data

5   input by said input device using a color conversion

table generated by a conversion table generation

apparatus of claim 22; and

output device which outputs image data converted

by said conversion device.

10   36.   The apparatus according to claim 35, wherein for

each pixel value of the image data,

said conversion device extracts a grid point near

the pixel value from the conversion table,

said conversion device calculates a distance

15   between the pixel value and the extracted grid point,

and

said conversion device obtains a pixel value

after conversion of the pixel value on the basis of

grid point values of the extracted grid point and grid

20   points near the extracted grid point, and the

calculated distance.

37.   A color conversion method comprising:

inputting image data;

converting the image data input in the input step

25   using a color conversion table generated by a

conversion table generation method of claim 34; and

outputting image data converted in the converting

step.

38. A control program for making a computer execute
an image processing method of claim 21.

39. A computer readable memory storing a control

5 program for making a computer execute an image
processing method of claim 21.

40. A control program for making a computer execute a
table generation method of claim 34.

41. A computer readable memory storing a control

10 program for making a computer execute a table
generation method of claim 34.

42. An image sensing apparatus for implementing a
color conversion table generation method of claim 34.

43. An image sensing apparatus comprising a color

15 conversion apparatus of claim 35.